CLAIMS

Having thus described the preferred embodiments, the invention is now claimed to be:

1. A communications system comprising:

a plurality of mobile wireless units (12_1, 12_2, ..., 12_n) located within a defined space **(16)** of a wireless local area network **(10)**;

a plurality of access points (14_1, 14_2, ..., 14_n) disposed at known locations in the defined space **(16)**, each access point (14_1, 14_2, ..., 14_n) operating at a dedicated frequency;

a means **(50)** for tracking movement of at least one mobile device (12_1) within the defined space **(16)** including:

a means **(52)** for scanning identified scanning frequencies of nearby access points to measure actual signal strengths between the at least one mobile device (12_1) and each of the nearby access points, and

a means **(56)** for calculating at least a location of the at least one mobile device (12_1) by comparing the actual signal strengths with a map **(42)** of relative signal strengths at predefined locations in the defined space **(16)**; and

a means **(60)** for assigning the nearby access points with strongest signals to the at least one mobile device (12_1) based on its location and the map **(42)** of relative strengths in the defined space **(16)**.

2. The system as set forth in claim 1, wherein the scanning means **(52)** only scans the frequencies of the assigned nearby access points.

3. The system as set forth in claim 1, wherein the tracking means **(50)** tracks the movement of the at least one mobile device (12_1) by periodically scanning the frequencies of three assigned access points adjacent the calculated location.

4. The system as set forth in claim 1, wherein the position tracking means **(50)** includes:

a velocity estimating means **(66)** for determining speed and direction of movement of the at least one mobile device (12_1).

5. The system as set forth in claim 3, wherein the tracking means **(50)** includes:

a means **(68)** for predicting future locations of the mobile device **(12_1)**, the assigning means **(60)** assigning the nearby access points based on the predicted location.

6. The system as set forth in claim 1, further including:

a means **(72)** for determining a degree of certainty of an accuracy of the calculated location.

7. The system as set forth in claim 6, wherein the number of nearby access points is a function of location accuracy certainty and the tracking means **(50)** tracks the movement of the at least one mobile device **(12_1)** by periodically scanning a variable number of frequencies.

8. The system as set forth in claim 1, further including:

a means **(38)** for measuring a plurality of initial signal strengths at predefined locations within the defined space **(16)**;

a means **(40)** for mapping the initial signal strengths in relation to predefined locations in the defined space **(16)**; and

a means **(62)** for identifying locations and scanning frequencies of the access points in the defined space **(16)**.

9. In a wireless local area network **(10)**, a method for handing off at least one mobile device **(12_1)** from one access point to another, the method comprising:

tracking a movement of the at least one mobile device **(12_1)** within the defined space **(16)** including:

scanning identified scanning frequencies corresponding to each of an identified plurality of nearby access points,

measuring actual signal strengths at each of the identified frequencies between the at least one mobile device **(12_1)** and the identified access points, and

calculating at least a location of the at least one mobile device **(12_1)** by comparing the actual signal strengths with a map of relative signal strengths at predefined locations in the defined space; and

assigning nearby access points with strongest signals to the at least one mobile device (12_1) based on the calculated location and the map **(42)**.

10. The method as set forth in claim 9, further including:

identifying frequencies dedicated to access points which are nearest to the mobile device (12_1); and

tracking the movement of the at least one mobile device by periodically scanning only the frequencies of the currently identified nearest access points.

11. The method as set forth in claim 10, further including:

tracking the movement of the at least one mobile device (12_1) by periodically scanning the frequencies of the three nearest access points.

12. The method as set forth in claim 10, further including:

updating the frequencies of the nearest access points as the mobile device changes location.

13. The method as set forth in claim 9, further including:

estimating at least a speed and a direction of movement of the mobile device (12_1);

predicting the mobile device location from the estimated speed and direction; and

reassigning the nearest access points based on the predicted location and the map **(42)**.

14. The method as set forth in claim 9, further including:

measuring a plurality of initial signal strengths at predefined locations within a defined space **(16)**;

mapping the initial signal strengths in relation to locations in the defined space **(16)**; and

identifying a plurality of locations and scanning frequencies of the access points located in the defined space **(16)**.

15. The method as set forth in claim 14, further including:

determining a certainty of an accuracy of the calculated location of the mobile device.

16. The method as set forth in claim 15, further including:

based on the certainty of the location calculation accuracy, adjusting a number of nearest access points whose frequencies are scanned; and

tracking the movement of the mobile device **(12_1)** by periodically scanning the frequencies of the currently nearest access points.

17. The method as set forth in claim 15, further including:

comparing the determined certainty with a requested threshold.

18. The method as set forth in claim 17, further including:

(a) in response to the certainty being below the requested threshold, scanning the scanning frequencies of a large number of the access points located in the defined space **(16)**;

(b) measuring actual signal strengths at each of the scanning frequencies between the at least one mobile device **(12_1)** and the corresponding access point;

(c) organizing the measured signal strengths in a categorized list;

(d) recalculating the location of the at least one mobile device **(12_1)**;

(e) recalculating a certainty of an accuracy of the recalculated location of the mobile device; and

(f) comparing the recalculated certainty with the requested threshold.

19. The method as set forth in claim 18, further including:

in response to the recalculated certainty being greater than the requested threshold, selecting at least three access points from the categorized list based on signal strengths.

20. The method as set forth in claim 18, further including:

in response to the recalculated certainty being below the requested threshold, measuring the number of the scanning frequencies from the categorized list;

repeating steps (d)-(f) until the threshold is exceeded; and

identifying a set of optimal scanning frequencies.

21. The method as set forth in claim 15, wherein a number of nearest access points is a variable based on the determined certainty of the location calculation accuracy.

22. The method as set forth in claim 9, wherein the frequencies of the nearby access points are different.

23. The method as set forth in claim 9, further including:

handing off a plurality of mobile devices in the defined space **(16)**;

evaluating an overall distribution of the mobile devices in the defined space **(16)** to determine a capacity of each access point; and

assigning the nearest access points to each mobile device based at least on both the determined capacity and the actual signal strength.

24. A communications system comprising:

a plurality of mobile wireless units **(12_1, 12_2, ..., 12_n)** located within a defined space **(16)** of a wireless local area network **(10)**;

a plurality of access points **(14_1, 14_2, ..., 14_n)** disposed at known locations in the defined space **(16)**, each access point **(14_1, 14_2, ..., 14_n)** operating at a dedicated frequency;

a computer processor **(26)** for tracking movement of the mobile devices and reassigning frequencies of closest access points to each mobile device, the computer processor being programmed to perform the steps of:

scanning identified scanning frequencies corresponding to each of an identified plurality of nearby access points,

measuring actual signal strengths at each of the identified frequencies between the at least one mobile device **(12_1)** and the identified access points,

calculating at least a location of the at least one mobile device **(12_1)** by comparing the actual signal strengths with a map **(42)** of relative signal strengths at predefined locations in the defined space; and

assigning nearby access points with strongest signals to the at least one mobile device **(12_1)** based on the calculated location and the map.